

SN 10,017,643  
Docket No. S-96,583  
In Response to Office Action dated January 14, 2005

#### AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

#### LISTING OF CLAIMS:

1. (Currently amended) A method for improving an electron density map representing a crystal structure comprising:
  - (a) obtaining by x-ray diffraction observed structure factor amplitudes for a plurality of reflections from the crystal structure;
  - (b) selecting a starting set of crystallographic phases to combine with the observed structure factor amplitudes to form a first set of structure factors;
  - (c) deriving a first electron density map from the first set of structure factors;
  - (d) identifying features of the first electron density map to obtain expected distributions of electron density;
  - (e) making a comparison between the first electron density map and the expected distribution of electron density;
  - (f) estimating how changes in the crystallographic phase of a reflection  $k$  affect the comparison;
  - (g) establishing crystallographic phase probability distributions from the comparisons for the possible crystallographic phases of reflection  $k$ ;
  - (h) repeating steps (c) through (g) as  $k$  is indexed through all of the plurality of reflections;
  - (i) determining a set of the most probable crystallographic phases for each one of the reflections from the crystallographic phase probability distributions; and
  - (j) deriving an updated electron density map using the observed structure factor amplitudes and the set of crystallographic phases determined to be most probable from the crystallographic phase probability distributions for each one of the reflections;
  - (k) repeating steps (d) through (j) with the first electron density map replaced with each updated electron density map until changes in the set of

SN 10,017,643  
Docket No. S-96,583  
In Response to Office Action dated January 14, 2005

crystallographic phases become minimal between successive iterations to obtain a final set of crystallographic phases with minimum bias from known electron density maps; and

(k)(l) forming a final electron density map using the final set of crystallographic phases.

2. (Original) The method of Claim 1, wherein identifying features of the electron density map includes making probability estimates of whether each point in the map is located in a solvent region or a crystal structure region.

3. (Original) The method of Claim 1, wherein identifying features of the electron density map includes estimates of whether the electron density at each point in the map is related by non-crystallographic symmetry to electron density at another point in the map.

4. (Currently Amended) The method of Claim 1, wherein identifying features of the electron density map includes estimates of whether a structural motif is located at each point in the map.

5. (Original) The method of Claim 4, wherein the structural motif is a helix.

6. (Original) The method of any one of Claims 1, 2, 3, or 4, wherein the crystallographic phase probability distributions are log-likelihood functions.

7. (Currently Amended) The method of Claim 1, wherein the step of determining a set of the most probable crystallographic phases further [including] includes the steps of calculating first and second derivatives for the crystallographic phase probability distributions with respect to the structure factors; and

applying [an FFT] a Fast Fourier Transform-based algorithm to determine the most probable crystallographic phase probability distributions for the first electron density map.

8. (Original) The method of Claim 1, wherein the step of selecting a starting set of crystallographic phases includes;

selecting a model crystal structure having similarities to the crystal structure being examined;

assigning a low weighting factor to structure factors of the model crystal structure; and

SN 10,017,643  
Docket No. S-96,583  
In Response to Office Action dated January 14, 2005

combining the weighted structure factors with the observed structure factors for  
deriving the first electron density map.